Trend Study 25C-28-03

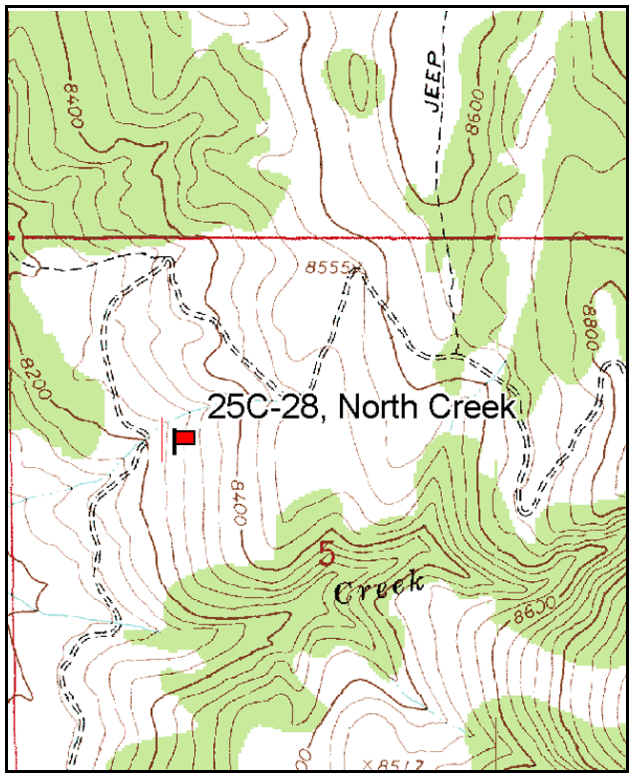
Study site name: North Creek . Vegetation type: Mountain Brush .

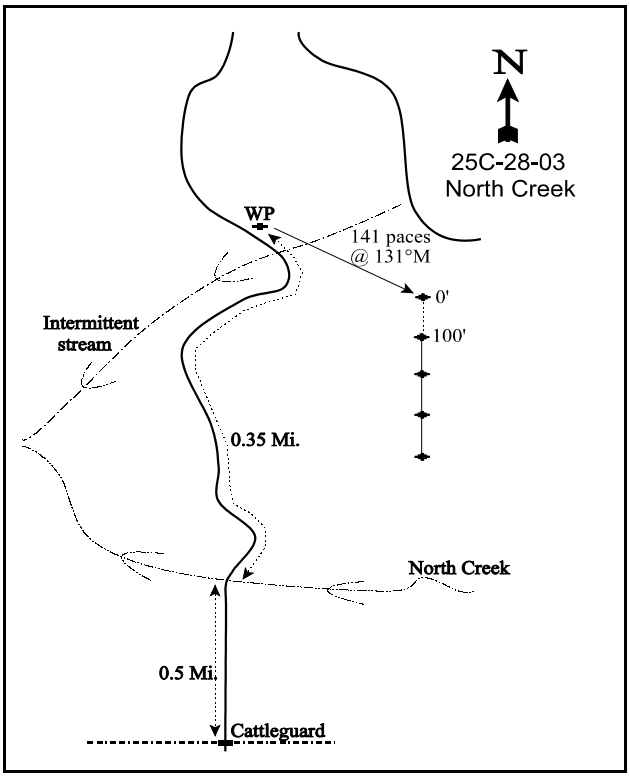
Compass bearing: frequency baseline 180 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the intersection of SR12 and Rt. 1660 (to 22) turn left onto Johns Flat Road. Drive 17.2 miles north to Grass Lake road (USFS sign) and turn east. Travel 1.2 miles on this road to a fork by hayfields. Turn right and continue 0.4 miles to the Horse Creek fork. Turn left and proceed 1.15 miles to a signed fork. Stay left and continue 0.25 miles on the main road. Pass the buildings, at Birch Creek, take the right fork and go 0.6 miles. Stay left at the fork and go 0.75 miles to a cattleguard. Continue 0.75 miles to a fork. Stay left and go 1.65 miles to a U.S. Forest Service exclosure. Continue 2.55 miles to a cattleguard. Continue 0.5 miles to North Creek. Cross and go 0.35 miles, over an intermittent stream and partway up a hill to a witness post on the right. The transect is 80 paces bearing 118 degrees magnetic up on a hillside. The 0-foot baseline stake is tagged #7168.





Map Name: Grass Lakes

Diagrammatic Sketch

Township 33S , Range 1W , Section 5

GPS: NAD 27, UTM 12S 4202467 N, 418663 E

DISCUSSION

North Creek - Trend Study No. 25C-28

This trend study site, located in the upper drainage of North Creek, samples a mixed mountain brush range dominated by pinyon-juniper, big sagebrush, and bitterbrush. The site has a westerly exposure and a moderate slope of 10%, which extends to a narrow sagebrush valley below. The area receives light to moderate deer use in mild winters, but is more indicative of a transitional range. Study site elevation is 8,300 feet. Pellet group data taken along the study site baseline in 1998 estimated 18 deer and 21 cow days use/acre (44 ddu/ha and 52 cdu/ha). One elk pellet group was also encountered. Rabbit sign was moderately abundant. Most of the deer pellet groups appeared old. Pellet group data from 2003 estimated low use at only 11 deer days use/acre (26 ddu/ha). Deer pellet groups appeared to be from spring and summer use.

The soil is an extremely rocky loam which is slightly acidic in reaction (pH 6.1). Rock and pavement are abundant on the soil surface, providing more than ½ of the total ground cover. Rock consists of basalt which is dark in color. The soil profile also contains high amounts of rock and gravel. Soil depth is relatively shallow with an effective rooting depth of just over 11 inches. Phosphorus is low at 8.3 ppm, when 10 ppm is considered the minimum for normal plant development. An abandoned road on the hillside has water bars to check erosion, which could become a problem on the site except for the protection afforded by the rocky surface. There is some evidence of soil pedestalling around shrubs and other signs of natural erosion.

There is an overstory of scattered pinyon pine and Rocky Mountain juniper on the site. Point-quarter data from 1998 estimated 46 pinyon and 29 juniper trees/acre. Average basal diameter was 3.4 inches for pinyon and 5.4 inches for juniper. Overhead tree canopy cover was variable, but averaged 5% over the site in 1998. The principal understory shrubs include mountain big sagebrush and bitterbrush. Sagebrush provided 56% of the total browse cover in 1998. Density of sagebrush was estimated at 8,466 plants/acre in 1987 increasing to 12,599 plants/acre in 1991. Density was very high considering the limited soil on the site. Over half (1,866 plants/acre) of the decadent plants sampled in 1991 were classified as dying. The larger sample used in 1998 estimated a much lower density of 6,380 plants/acre. Most of the change in density is due to the larger sample as the dead plants in the population can only explain 26% of the decrease. It appears that most of the decadent/dying plants sampled in1991 died prior to the 1998 reading. Forty-seven percent (580 plants/acre) of the decadent sagebrush sampled in 1998 appeared to be dying, indicating possible further reductions in sagebrush density. Reproduction was limited and not adequate to maintain the stand. Utilization of the sagebrush has been mostly light to moderate since 1987, with some heavy use on some individual plants indicating preferential ecotypic variation within the population. The area burned in 2002. The fire burned all of the shrubs along the first 200 feet of the study site baseline and burned more spotty along the rest of the baseline. Density of sagebrush was estimated at 1,520 plants/acre in 2003, about 1/3 of which were classified as decadent. Use was light and vigor good on all but 11% of the plants sampled. Mature sagebrush that survived the fire produced abundant seed and had excellent annual leader growth averaging 3 inches in 2003. Young plants were moderately abundant.

Bitterbrush is also a key species on the site, although not as numerous. It provided 28% of the shrub cover in 1998. Density increased 64% between 1987 and 1991, from 599 to 1,666 plants/acre. The larger sample used in 1998 estimated a similar density of 1,100 plants/acre. Bitterbrush generally displayed moderate hedging, good vigor, and low decadence. Other preferred browse species such as curlleaf mountain mahogany, serviceberry, and snowberry are found scattered in the area but they are relatively uncommon. Nearly all of the bitterbrush was eliminated by the fire. Density was estimated at only 80 plants/acre in 2003, with half of those being mature plants. Use of bitterbrush was moderate to heavy in 2003. Nearly all of the pinyon and juniper trees were eliminated by the fire.

Grass and forb frequencies are very low, undoubtedly due to the rocky nature of the soil surface. Seven grass species were sampled in 1998 but they combined to produce less than 1% cover. The most common species are bottlebrush squirreltail and blue grama. Forbs are diverse with 17 species encountered in 1998 and 2003.

However, none occur more than occasionally and production is poor with these species combining to produce less than 1% cover in 1998. Forb production increased after the 2002 fire with forb cover averaging over 6% in 2003.

1987 APPARENT TREND ASSESSMENT

Soil conditions on the site are poor with rock and pavement covering 53% of the ground surface. Erosion is not a problem however and there is little exposed bare ground. The site supports a thick stand of mountain big sagebrush which shows light to moderate use, good vigor, and low decadence. The more preferred bitterbrush occurs in small numbers. It also shows light to moderate use, good vigor and no decadent plants were sampled. It appears, due to the high elevation of this site, that this area is used more as transitional and summer range. The herbaceous understory shows good diversity but poor production.

1991 TREND ASSESSMENT

Basic cover characteristics have changed little since 1987. Vegetative basal cover has increased slightly while rock-pavement cover have remained the same. Litter cover decreased from 40% to 36% with percent bare ground increasing from 5% to 7%. With bare ground still less than 10%, the trend for soils on this site would still be considered stable. However, percent bare ground should be monitored closely. There are two key browse species on site, mountain big sagebrush and antelope bitterbrush. Mountain big sagebrush has increased substantially since 1987. Sagebrush decadence is only 26%, which should not be considered a problem with an extremely high density (12,599 plants/acre) and the extended drought are figured in. Bitterbrush has more than doubled its population (599 to 1,666 plants/acre) with a biotic potential of 11% (proportion of seedlings). Bitterbrush decadence is moderate at 32%, but this is consistent with what has been observed in other areas during the extended drought. Trend for browse is up. Trend for grasses and forbs is down slightly due to a slight decline in the sum of nested frequency values for both grasses and forbs.

TREND ASSESSMENT
soil - stable (3)
browse - up (5)
herbaceous understory - down slightly (2)

1998 TREND ASSESSMENT

Trend for soil appears stable with similar amounts of bare ground, rock, pavement and litter cover. Vegetation cover is higher due to the change in methods since 1991. Previously only basal cover was estimated, now total aerial cover is estimated. Trend for browse is mixed. Mountain big sagebrush has a declining population which has gone down 49% in density since 1991. Percent decadence is moderate at 19%, but 47% (580 plants/acre) of the decadent plants appear to be dying. Reproduction is poor and not adequate to maintain the population. Trend for bitterbrush appears stable. Density has declined slightly, although use is lighter and percent decadence reduced from 32% to 9%. Leader growth is excellent and reproduction is good. Since mountain big sagebrush provides 56% of the browse cover on the site, overall browse trend is considered down slightly. The herbaceous understory is deficient producing only 1.6% cover. Sum of nested frequency of grasses has declined while frequency of forbs has remained stable. Overall trend for the herbaceous understory is considered down slightly and in very poor condition.

TREND ASSESSMENT
soil - stable (3)
browse - down slightly (2)
herbaceous understory - down slightly and very poor (2)

2003 TREND ASSESSMENT

Trend for soil is down due to the fire which burned the area in 2002. Vegetation cover and litter cover declined 2.9 and 2.5 fold respectively. Cover of bare ground increased more than 2 fold but is still relatively low at 11%. Rocks and pavement cover 69% of the ground surface. Erosion is not a problem due to the abundant rock cover. Another positive factor is the 5 fold increase in herbaceous cover. Trend for browse is down. Fire eliminated most of the shrubs on the first half of the study site baseline but burned more spotty along the rest of the baseline. Density of sagebrush declined 76% to 1,520 plants/acre. Use was light, vigor good, and young recruitment is currently adequate to maintain the stand. Surviving mature plants are producing abundant seed and display excellent annual leader growth averaging 3 inches in 2003. Most of the bitterbrush was eliminated by the fire but some mature plants survived. Density was estimated at only 80 plants/acre, half of which are young. Use of the surviving bitterbrush was moderate to heavy. Trend for the herbaceous understory is up slightly. Sum of nested frequency of perennial grasses declined slightly but frequency of perennial forbs increased 33%. In addition, production of perennial grasses more than doubled (0.74% to 1.93%) while cover of perennial forbs rose nearly 8 fold (0.82 to 6.36%). Total herbaceous cover is still low however, averaging only 8.5% cover in 2003. The most abundant grass sampled in 2003 was bottlebrush squirreltail which accounted for 73% of the total grass cover. Common forbs included beckwith milkvetch and lobeleaf groundsel. The herbaceous understory is still poor and limited by the extremely rocky nature of the soil surface.

TREND ASSESSMENT
soil - down (1)
browse - down due to the fire (1)
herbaceous understory - up slightly (4)

HERBACEOUS TRENDS --
Management unit 25C, Study no: 28

Type	Species	Nested Frequency				Average Cover %	
		'87	'91	'98	'03	'98	'03
G	Agropyron cristatum	$_{c}$28	$_{b}$10	$_{ab}$1	$_{a}$-	.01	-
G	Agropyron spicatum	2	-	-	1	-	.03
G	Bouteloua gracilis	-	2	2	2	.15	.15
G	Bromus inermis	$_{b}$12	$_{ab}$6	$_{a}$4	$_{a}$-	.01	-
G	Bromus tectorum (a)	-	-	$_{a}$2	$_{b}$13	.00	.21
G	Oryzopsis hymenoides	$_{b}$9	$_{ab}$2	$_{ab}$1	$_{a}$-	.00	-
G	Poa fendleriana	-	3	2	3	.01	.15
G	Poa secunda	2	3	-	-	-	.03
G	Sitanion hystrix	$_{ab}$82	$_{b}$90	$_{ab}$69	$_{a}$48	.54	1.57
G	Stipa lettermani	$_{b}$19	$_{a}$4	$_{a}$-	$_{a}$-	.01	-
Total for Annual Grasses		0	0	2	13	0.00	0.21
Total for Perennial Grasses		154	120	79	54	0.74	1.93
Total for Grasses		154	120	81	67	0.74	2.15

Type	Species	Nested Frequency				Average Cover %	
		'87	'91	'98	'03	'98	'03
F	Antennaria rosea	1	1	1	-	.00	-
F	Arabis spp.	$_{b}$16	$_{ab}$6	$_{ab}$7	$_{a}$1	.02	.01
F	Astragalus beckwithii	$_{a}$-	$_{ab}$7	$_{bc}$14	$_{c}$29	.07	1.73
F	Astragalus convallarius	2	3	5	3	.15	.04
F	Chaenactis douglasii	-	6	5	-	.04	-
F	Crepis acuminata	-	4	3	-	.00	-
F	Cryptantha bakeri	10	8	10	16	.10	.25
F	Descurainia pinnata (a)	-	-	1	-	.00	-
F	Erigeron pumilus	$_{a}$-	$_{a}$3	$_{b}$21	$_{a}$8	.14	.24
F	Eriogonum racemosum	7	6	3	10	.05	.20
F	Gayophytum ramosissimum(a)	-	-	$_{a}$-	$_{b}$68	-	.55
F	Gilia spp. (a)	-	-	-	5	-	.07
F	Hymenopappus filifolius	$_{b}$10	$_{a}$-	$_{a}$-	$_{a}$1	-	.15
F	Hymenoxys richardsonii	$_{b}$12	$_{ab}$4	$_{a}$-	$_{a}$-	-	-
F	Linum lewisii	4	2	-	-	-	-
F	Lotus utahensis	5	4	6	9	.01	.22
F	Lygodesmia spinosa	$_{b}$16	$_{ab}$11	$_{a}$1	$_{ab}$8	.00	.22
F	Machaeranthera canescens	$_{b}$13	$_{ab}$6	$_{a}$-	$_{ab}$2	.03	.19
F	Oenothera caespitosa	8	7	-	7	-	.68
F	Petradoria pumila	15	14	4	3	.09	.18
F	Phlox longifolia	$_{ab}$9	$_{b}$20	$_{a}$5	$_{a}$6	.01	.01
F	Physaria spp.	-	3	-	-	-	-
F	Senecio multilobatus	$_{b}$11	$_{a}$-	$_{b}$31	$_{c}$52	.06	1.58
F	Streptanthus cordatus	4	3	1	-	.00	-
F	Tragopogon dubius	1	-	-	1	-	.00
F	Unknown forb-perennial	17	-	-	-	-	-
Total for Annual Forbs		0	0	1	73	0.00	0.62
Total for Perennial Forbs		161	118	117	156	0.82	5.75
Total for Forbs		161	118	118	229	0.83	6.36

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 25C, Study no: 28

Type	Species	Strip Frequency '98	Strip Frequency '03	Average Cover % '98	Average Cover % '03
B	Artemisia nova	4	0	1.67	-
B	Artemisia tridentata vaseyana	97	29	21.14	5.35
B	Chrysothamnus nauseosus	2	12	-	.51
B	Chrysothamnus viscidiflorus viscidiflorus	6	4	.03	.38
B	Gutierrezia sarothrae	8	27	.25	.93
B	Juniperus scopulorum	2	1	1.50	.15
B	Pediocactus simpsonii	0	1	-	.00
B	Pinus edulis	8	0	2.62	-
B	Purshia tridentata	38	4	10.36	.00
B	Tetradymia canescens	0	1	-	-
Total for Browse		165	79	37.60	7.34

CANOPY COVER, LINE INTERCEPT --
Management unit 25C, Study no: 28

Species	Percent Cover '98	Percent Cover '03
Artemisia tridentata vaseyana	-	6.26
Chrysothamnus nauseosus	-	.46
Chrysothamnus viscidiflorus viscidiflorus	-	.28
Gutierrezia sarothrae	-	1.25
Juniperus scopulorum	1.79	.78
Pinus edulis	3.00	-

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 25C, Study no: 28

Species	Average leader growth (in) '03
Artemisia tridentata vaseyana	3.0
Purshia tridentata	4.4

POINT-QUARTER TREE DATA --
Management unit 25C, Study no: 28

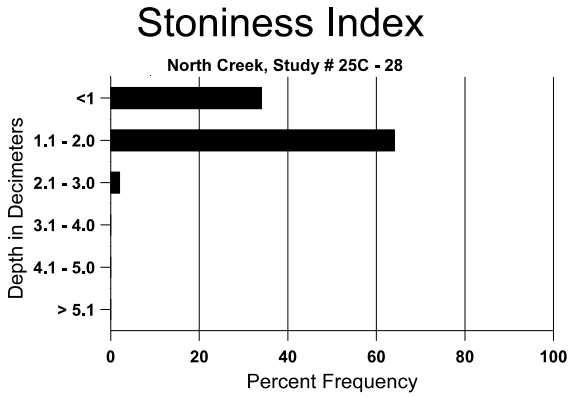
Species	Trees per Acre		Average diameter (in)	
	'98	'03	'98	'03
Juniperus scopulorum	29	N/A	5.4	N/A
Pinus edulis	46	N/A	3.4	N/A

BASIC COVER --
Management unit 25C, Study no: 28

Cover Type	Average Cover %			
	'87	'91	'98	'03
Vegetation	2.50	4.25	42.77	14.67
Rock	18.75	21.25	15.84	30.12
Pavement	34.00	31.25	32.10	38.38
Litter	39.75	36.25	34.57	13.84
Cryptogams	0	0	0	0
Bare Ground	5.00	7.00	4.58	11.23

SOIL ANALYSIS DATA --
Management unit 25C, Study no: 28, Study Name: North Creek

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
11.3	58.3 (11.6)	6.1	46.0	29.4	24.6	2.7	8.3	211.2	0.4



PELLET GROUP DATA --
Management unit 25C, Study no: 28

Type	Quadrat Frequency '98	Quadrat Frequency '03	Days use per acre (ha) '98	Days use per acre (ha) '03
Rabbit	7	1	-	-
Cow	-	-	21 (52)	1 (2)
Elk	-	-	1 (2)	-
Deer	14	1	18 (44)	11 (26)

BROWSE CHARACTERISTICS --
Management unit 25C, Study no: 28

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Artemisia nova											
87	**266**	-	-	266	-	-	50	0	0	0	9/11
91	**0**	-	-	-	-	-	0	0	0	0	-/-
98	**340**	-	-	280	60	-	29	0	18	6	11/18
03	**0**	-	-	-	-	-	0	0	0	0	-/-
Artemisia tridentata vaseyana											
87	**8466**	-	533	6600	1333	-	35	0	16	0	12/15
91	**12599**	-	733	8533	3333	-	28	6	26	15	12/16
98	**6380**	40	200	4940	1240	1600	38	1	19	19	15/26
03	**1520**	40	140	940	440	4840	0	0	29	11	15/26
Chrysothamnus nauseosus											
87	**0**	-	-	-	-	-	0	0	0	0	-/-
91	**266**	-	-	133	133	-	0	75	50	25	4/4
98	**40**	-	-	40	-	-	0	0	0	0	10/14
03	**240**	-	-	240	-	-	0	0	0	0	11/14
Chrysothamnus viscidiflorus viscidiflorus											
87	**466**	-	-	466	-	-	0	0	0	0	11/7
91	**266**	-	-	200	66	-	50	0	25	0	5/5
98	**140**	-	20	120	-	-	0	0	0	0	10/9
03	**80**	-	-	80	-	-	0	0	0	0	12/16
Eriogonum microthecum											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**66**	-	-	66	-	-	0	0	-	0	5/8
98	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	0	-/-

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae											
87	**800**	-	-	800	-	-	0	0	0	0	9/7
91	**1132**	-	133	866	133	-	0	0	12	6	7/5
98	**180**	60	20	160	-	-	0	0	0	0	11/9
03	**1160**	-	20	1140	-	-	0	0	0	0	10/11
Juniperus scopulorum											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	66	-	-	-	-	0	0	-	0	-/-
98	**40**	60	20	20	-	-	0	0	-	0	-/-
03	**20**	-	-	20	-	-	0	0	-	0	-/-
Pediocactus simpsonii											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**40**	-	-	40	-	-	0	0	-	0	1/2
Pinus edulis											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**180**	40	140	40	-	-	0	0	-	0	-/-
03	**0**	-	-	-	-	120	0	0	-	0	-/-
Purshia tridentata											
87	**599**	-	66	533	-	-	22	0	0	0	33/37
91	**1666**	200	200	933	533	-	84	8	32	0	35/44
98	**1100**	60	120	880	100	160	47	0	9	4	28/56
03	**80**	20	20	40	20	80	25	50	25	25	15/23
Tetradymia canescens											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**20**	-	-	20	-	-	0	0	-	0	10/14